

Rockwell (A. D.)

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ELECTRICITY TO THE CENTRAL NERVOUS SYSTEM.

(CENTRAL GALVANIZATION.)

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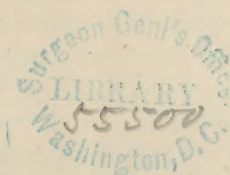
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ON THE APPLICATION OF Electricity to the Central Nervous System.*

(CENTRAL GALVANIZATION.)

IN a comprehensive article on this topic of central galvanization, it would be necessary to refer more particularly to the physiology of the central nervous system, and to review the subject of electro-physiology; but, as my aim is practical, I simply propose to consider a few questions that naturally arise in relation to the direct effect of electricity on the central nerves, together with the *modus operandi*, and clinical results of this peculiar method.

I. *Is it possible for electricity (in medicinal or therapeutic doses if I may so speak) to penetrate to the brain, spinal cord, and sympathetic, and directly affect these organs?* In regard to the faradic current in its relations to the brain and spinal cord, all experiment and experience answer decidedly in the negative. In the construction of certain helices, the combination of wires is such that the current proceeding from them may produce an undoubted glimmer before the eyes, simulating the flashes of light following galvanic excitation of the retina.

Even from the coils in most ordinary use, we obtain a current that is sufficient, in certain pathological conditions of the brain, to cause dizziness and flashes of light, while in irritable conditions of the spinal cord it is not unusual for a mild faradic current to be followed by the same phenomena of tingling and numbness in the extremities that are frequently observed after galvanization of the spine. Now, these effects are purely the result of reflex action, for in the healthy brain, not only does faradization fail to produce dizziness, or to excite the function of any of the nerves of special sense, but patient ex-

* Read before the New York County Medical Society.

periment, by the aid of the rheoscopic frog, has failed to detect the passage of even very intense currents through the bony covering of the head.

The great sympathetic is readily influenced by the faradic current, but it is impossible to localize its effects in special ganglia, and because of the very general way in which it is alone capable of affecting this system, I prefer to exclude it in the consideration of the electrical treatment of the central organs. So far as it concerns the great sympathetic, it is best treated under the head of general faradization. The galvanic current has far greater power. Not only do the observed effects of its application to the head teach, but actual experiment proves, that it readily penetrates to all portions of the brain.

How quickly does it affect every nerve of special sense and cause its function to be manifested! Let its gentle influence pervade the brain-substance, and the peculiar metallic taste, which is the guide to its efficient action, is instantly perceived. Interrupt the steady flow of its current, and a flash of light follows as evidence of retinal excitation. Pass it transversely through the head for a moment, and, though nothing may be felt, or seen, or tasted, yet the instant of the interruption of the current, vertigo follows, intense in proportion to the strength of the galvanic action.

All these phenomena point unmistakably to a direct central action of the current, and the confirmation is now perfect through the well-known and ingenious experiments of Erb with the galvanoscopic frog.

The sympathetic nerve is very susceptible to galvanic influence. The first experimental researches on the function of the sympathetic nerve are familiar and yet interesting. It was pointed out that after section of the cervical sympathetic in a living animal the circulation became more rapid, and the heat and susceptibility of the head decidedly increased.

These phenomena which were caused by paralysis of the vaso-motor nerves immediately disappeared when the cephalic extremity of the sympathetic was galvanized, only to return, however, when this influence was discontinued. The current

caused constriction of the paralyzed and dilated arterioles through its indirect influence on the vaso-motor nerves.

II. *What are the observed physiological effects of galvanization on the central nervous system?* I have already spoken of its influence over the senses of sight and smell, and have alluded to the readiness with which it causes vertigo when passed transversely through the brain.

Let any one experiment a little with the current, and he will find, singularly enough, that when one electrode is placed on the forehead and the other on the occiput, or one on the summit of the head and the other on the stomach—after the method of central galvanization presently to be described—galvanization is followed by little if any tendency to vertigo. On the contrary, when a current of even feeble tension is passed from temple to temple, or from one mastoid bone to its fellow, very decided dizziness is at once perceived, which continues during the operation of the current, and becomes most decidedly manifested at the moment the circuit is broken.

During the passage of the current, there is a very marked and quite irresistible tendency to lean toward the positive pole, while objects in view seem to move in the same direction. When the circuit is opened there is a reversal in the direction of the seeming movements, and the experimenter instantly bends in the opposite direction, toward the negative pole.

For these phenomena an ingenious and plausible explanation is given by Hitzig: When the current passes from the forehead to the occiput, the right and left lobes of the brain and all that pertain to them are equally or symmetrically influenced, and little if any dizziness is perceived. Place, however, the anode upon one temple and the cathode upon the other, and mark the readiness with which dizziness is produced.

In this operation the brain is no longer symmetrically affected. One hemisphere is in a condition of anelectrotonos or diminished irritability, while the other is in a condition of catelectrotonos or increased irritability, or, as it is expressed, there is a falsification of the muscular sense, a disturbance of the equilibrium, and the apparently involuntary inclination

toward the anode is in reality a voluntary effort to restore the imaginary loss of balance.

These, then, are the principal physiological results of external galvanization of the brain.

The observed effects of galvanic excitation of the cord and sympathetic are less marked, but no less real than the phenomena following galvanization of the brain. Galvanization of the sympathetic is of itself such a comprehensive topic for speculation that in this paper it is impossible to do more than call attention to the fact that both clinical observation and the ophthalmoscope render it evident that external applications of the current appreciably affect its ganglia and powerfully influence the vaso-motor system of nerves.

The so-called diplegic contractions, to which attention was first called by Remak, give the strongest evidence of the possibility of directly influencing the cervical ganglia of the sympathetic by external galvanization. He was the first to note the fact that, when the positive pole is placed in the auriculo-maxillary fossa, and the negative in the neighborhood of the sixth cervical vertebra, and a current of sufficient tension is used, contractions of the muscles of one or both hands are frequently observed. Subsequently, Fieber confirmed these experiments by exposing the sympathetic in living animals and submitting it to the action of the current. In my own practice, I have so frequently, and under such a variety of circumstances, observed this phenomenon, that I cannot hesitate to believe that direct stimulation of the cord and the phenomena of diplegic contractions are related to each other as cause and effect.

I first entertained the idea of directly influencing the central nervous system, in certain morbid conditions, by the galvanic current more than four years ago. It is possible that the method of central galvanization had been before attempted, especially by some of the German school; at all events, I had not heard of any systematic endeavors in this direction, and it is certain that little if any thing had been accomplished by this method in the treatment of the wide variety of nervous disorders where its value has now been so thoroughly tested.

My first experience in the use of central galvanization was not at all satisfactory, and for two reasons: 1. We had then no galvanic apparatus that was certainly reliable, and in which all the essential factors were combined for the ready regulation and modification of the current in its application to sensitive conditions. 2. We confined our endeavors mostly to those forms of central disease (structural in character) which in the light of subsequent experience have proved in so many cases to be little amenable to the therapeutics of electricity.

In the most thorough form of central galvanization, one pole (the anode) is placed on the vertex of the skull, or, as it is generally termed, the cranial centre, while the cathode is applied to the epigastrium.

A current, varying in intensity and in the length of its application according to the exigencies of the case, is now allowed to pass. It is not necessary, as a rule, to moisten all the hair of the head and apply the electrode to its entire surface. I prefer rather to wet a narrow tract from the cranial centre to the region of the sixth cervical vertebra or cilio-spinal centre, so that I can slide the electrode along the surface, and thus, during an entire *séance*, keep up a constant influence and avoid even the possibility of an interruption of the current with its resultant shock. From the cilio-spinal centre the electrode is passed gradually along the spine to a point opposite the epigastrium, the seat of the cathode.

In regard to the length of these *séances* each case must be in some measure a law unto itself. In speaking elsewhere of faradization I have remarked that there was to it a more varying degree of susceptibility than to almost any other agent. This statement applies equally if not more so to central galvanization; and I speak most earnestly, and from considerable experience, when I say that a careless and ill-directed application of the galvanic current to the central nervous system may produce absolute physical injury as well as contribute to the already swollen catalogue of evidence (both positive and negative) against electro-therapeutics. Patients are often treated who are so susceptible to central galvanization that the current from two or three ordinary cells will produce

decided effects that are both immediate and secondary. The immediate effects are the results of excitation of the nerves of special sense and are of course temporary; the secondary are manifested a short time after the cessation of treatment, and may be permanent. These secondary effects, if favorable, are seen in increased mental clearness; in the relief of the various forms of neuralgic pains and muscular twitchings that are of central origin, or in the restoration of lost power of sleep. In another patient it may require ten cells to effect these same results. So far, however, as positive directions can be given I may say that rarely should the applications to the head be longer than two or three minutes, and in many cases from fifteen to thirty seconds is all-sufficient. I need hardly say that in other instances galvanism is contraindicated; even the slightest current tends to evil rather than good.

It is especially important, in the treatment of the highly-excitabile and nervous, that no sudden shock or flashes of light should be produced.

As a rule, the metallic taste, which is instantly noticed by the patient when even the mildest current is used, is a sufficient guide for a first or tentative application. Subsequently in many cases the current may be increased, even until its stinging or burning effects are observed at the stomach. While in the great proportion of cases the metallic taste appears long before the current is sufficiently intense to be felt in the slightest degree at either pole, occasionally the order is reversed, and actual pain may follow the application before there is any appreciable excitation of the gustatory nerve. In such cases I have observed that the brain is in a remarkable degree tolerant to the effects of the current. In regard to the electrodes, let me simply say that the positive, or the one at the head, should be several times the size of its fellow at the stomach.

The galvanometer is to me an indispensable appliance in the use of central galvanization. All galvanic apparatus that I ever used are liable at times, from failure of some one of the many factors that contribute to an equal and constant flow of the current, to fail us at the critical moment. We frequently desire to use a current of insufficient strength, when

applied externally, to excite in the patient the sensation of feeling, or any of the nerves of special sense. To be absolutely sure that the current is operating evenly and well, it is necessary either to feel it or to see its effects, and the only ready method of causing it to be manifest to either the feeling or taste, is to apply the electrode to the tongue. This, however, is not only disagreeable to the operator, but, if persisted in, may be of decided injury. The galvanometer, taking the degree as its unit of measurement, detects the mildest current, and relieves the mind from all doubts as to its efficient action.

So far as my clinical observation extends, I may say that it is in the varied forms of hysteria, hypochondriasis, and melancholia, in neuralgias of central origin, in spinal congestion and irritation, in chorea and kindred spasmodic affections, that central galvanization seems to be especially indicated.

The cases that follow are all taken from private practice, and, as will be observed, the success achieved in every one is either complete or approximate. I am very far from wishing to be understood that the results of these cases are typical of those that may be expected in every instance where central galvanization is apparently indicated. As I have frequently remarked concerning other methods of electrization, the failures are sufficiently frequent. I have purposely selected from my clinical note-book a number of well-authenticated cases, that illustrate the very best results of central galvanization :

Melancholia of Two Years' Standing in a Young Married Lady.—Complete Recovery under Central Galvanization after Failure of Persistent Internal Medication and Faradization.

CASE I.—Mrs. Y., a married woman, aged twenty-five, came first under my observation October 8, 1871, in the seventh month of her pregnancy. Her mental condition was lamentable in the extreme. There was chiefly a perversion of the whole habit or manner of feeling, such as so frequently follows actual intellectual derangement. She confessed and bewailed her want of interest in or love for those who were nearest to her, and evidently suffered most intensely

from a profound feeling of depression and misery—a vast and formless idea of utter desolation. The patient appreciated her condition, would reason concerning it, and acknowledge that there was nothing real to which she could point as a cause for her misery.

These wretched feelings were not altogether new, but for over two years had in a modified form annoyed her considerably. Bitten slightly by a favorite dog, she merged immediately into a condition that may be called hypochondriacal melancholia, with an exaggerated notion of the danger she had incurred. She had been treated persistently but without avail, and as a *dernier ressort* faradization was attempted. It utterly failed in its effects, and in good faith the patient was encouraged to hope that with her delivery, her mental balance would return. The child was born, and three months subsequently I was again called to see the mother, only to find her condition more aggravated than at any previous time. I now resolved to make use of central galvanization, and employed a current from six ordinary-sized zinc carbon-cells, with a sitting of four minutes. The patient was not at all improved by the *séance*, but seemed, if any thing, slightly more sensitive to external impressions.

In a couple of days the same application was again tried, with the evident result of decidedly exciting her mind. A third effort was made with but three cells, from which the current was just sufficient in tension to call into action the sense of taste. From this trial the patient experienced undoubted relief, and at intervals of a day, the application without being varied excepting in the length of the *séance*, was repeated for some two months. Although during the treatment two or three slight relapses occurred, yet on the whole, the improvement was steady and satisfactory, and at the close of the “central” treatment, when she was placed entirely in the care of Dr. William J. Donor for uterine difficulty, her recovery was complete.

Spasmodic Cough, unique in Character and of Unusual Persistence and Severity.—Recovery under Central Galvanization.

CASE II.—Miss H., aged sixteen, was transferred to my

care by the family physician, Dr. H. H. Gregory. The case is an example of an unusually susceptible nervous organization, and is a good illustration of the readiness with which many so-called nervous symptoms change their seat and character. The distinct and positive features that stand so boldly relieved in the progress of this particular case, may serve to explain the more subtle and less marked change of symptoms that so often occur in certain nervous diatheses, only to perplex and to set at naught the resources of therapeutics. The patient was a lively, impressible girl, prone to physical indiscretions, and careless of consequences. She had suffered for a number of years from frequent and unusually severe attacks of sick-headache, but as soon as the paroxysm had passed away, she regained her usual strength and buoyancy. The sudden and unexpected death of a sister, naturally enough, stirred up her emotional nature to its depths, and, together with an imprudent exposure of her person to cold and dampness, seemed to be the exciting cause of a most remarkable, persistent and distressing cough, which, slight at first, reached its height in severity in the month of March, 1872. Amid the numberless efforts that were made by both internal medication and inhalations, but one remedy seemed to be of the slightest service. For a time the paroxysms seemed to abate somewhat under the influence of chloral, although no permanent benefit was derived from its use. When, during the latter part of July, I first saw the case, through the kindness of Dr. Gregory, the following was the prominent characteristic of her paroxysmal attacks: Every one will instantly recognize the peculiar harsh or grating sound which is so often elicited by the downward thrust of a saw that is improperly handled or insufficiently oiled. The cough of our patient exactly simulated this sound, and, when it first fell upon my ears, I supposed that some one was sawing in the adjoining room.

During a paroxysm, the expiratory efforts were just one a second in frequency, and from a dozen to sixty in number.

The violence of the attack would rack her terribly, and when prolonged was followed by considerable exhaustion. The paroxysms themselves occurred so often, some twenty or twenty-five times during the twenty-four hours, that she was

necessarily obliged to give up all attendance at places of public resort, and confine herself mostly at home.

On account of my absence from the city most of the month of August, the patient was not fairly submitted to my treatment until September. I then submitted her to a thorough laryngoscopic examination, and found nothing abnormal, with the exception of a slight tendency to congestion of the vocal cords. To dissipate any doubt in regard to the existence of pulmonary disease, the patient was thoroughly examined by Dr. Austin Flint, who pronounced the lungs to be in a healthy condition, and agreed as to the essentially nervous origin of the symptoms.

In the treatment of the case by central galvanization, I was gratified to observe, after the first few tentative applications, an appreciable improvement in the character of the cough. Instead of that harsh and painful sound resulting as we believed from the exceedingly tense condition of the vocal cords, the cough assumed a softer or looser character and was much less disturbing; this we conceived depended on the decreased local spasmodic action. Freed from wearisome details, the subsequent history of the case is included in the simple statement that the patient improved from time to time, until after two months of treatment, and the administration of some thirty-five applications, the recovery was perfect.

It is interesting to note that she has been afflicted by no return of the sick-headaches from which she had so constantly suffered, before it was swallowed up in this last attack.

The following case, although it seemed for a time to defy all attempts at permanent relief, and at last yielded with unusual reluctance, may certainly be regarded, taking into consideration the seeming hopelessness of the symptoms, as the best result of central galvanization in spinal irritation and congestion that I have witnessed. I say spinal irritation and congestion, because the symptoms that are supposed to be pathognomonic of one or the other of these conditions are, in the course of an ordinary clinical experience, so frequently observed to mingle, or as it were to overlap and run into each other, that it is impossible in these cases to decide that either

irritation or congestion alone exists as a distinct disease of the cord.

Spinal Irritation and Congestion in its most Severe Form, and of Several Years' Duration.—Permanent and Perfect Recovery follows General Faradization and Central Galvanization.

CASE III.—Miss H., a young lady of twenty-five, was placed under my care by Dr. J. C. Halsey, of Brooklyn. The most marked symptoms were, on the one hand, an excessive tenderness at various points of the spine, from the upper cervical to the lumbar region, neuralgic pains in the abdomen and extremities, nausea and spasmodic cough with palpitation, and on the other tingling and numbness in the fingers and toes, with an inability to freely use the legs, that simulated an incomplete paraplegia. The first-named symptoms pointed to irritation, while the latter indicated congestion of the cord, and, viewing them as a whole, it seemed evident that both conditions were present. The patient was utterly incapacitated for the slightest exertion, either mental or physical, and for several years existence had proved a burden to be borne with fortitude, rather than a joy to be loved and cherished.

It may be said that she had never been robust, but from childhood had suffered from palpitation and shortness of breath, that indicated a point in the upper spinal tract that might at any time prove vulnerable to either physical or mental influences. In this unfortunate case, every thing in the way of the usual and accepted methods of treatment had been tried, and had utterly failed, and by the advice of the late Dr. H. D. Bulkley, Dr. Halsey decided to try electrization and requested me to take charge of the patient. She was first submitted to the tonic influence of general faradization, and with such decided benefit that, after some fifteen applications, most of her symptoms decreased in severity, and she was able to ascend the stairs and walk two or three blocks with comparative comfort. More than this, general faradization on further trial failed to accomplish. I then resorted to exceedingly mild galvanization of the whole length of the spinal cord, and with immediate beneficial results. The

tenderness along the spine gradually decreased, until it altogether disappeared. The nausea and neuralgic pains, tingling and numbness in the extremities, slowly but surely became less marked, the limbs became strong, until finally the patient fully recovered, and with more strength and vigor than she had ever had.

Sacral Neuralgia, associated with Hyperæsthesia from the Waist downward, and with Tonic Muscular Contractions of one Leg.

CASE IV.—At the request of Dr. Fisher we called on Mrs. M. (the wife of a physician), who for many months had been an inmate of the private hospital of Dr. Charles F. Taylor.

We found her in bed, utterly unable to assist herself to any extent, and with a deep-seated expression that indicated a condition of constant pain and anxiety. On examination, we found the limbs somewhat wasted, and one of them permanently drawn up by gradually-developed muscular contractions. The most marked feature of her disease, however, was a condition of excessive hyperæsthesia extending from her waist downward. Not only was the patient unable to move her lower limbs, or to have another move them, without experiencing the most horrible pains, but around the waist and hips, and over the abdomen, she shrank from the slightest touch. Dr. T. Gaillard Thomas, under whose special care she was, and who had treated her for uterine difficulty, regarded the case as one of neuralgia of the sacral nerves, and, in the hope of affording relief, had removed the coccyx. It proved to be of no service, and all methods for her relief seemed unavailing. We began treatment March 5, 1871, by administering an exceedingly mild and fine faradic current to the neck, spine, and abdomen. Indeed, the current was so weak as to be hardly appreciable to the patient.

These applications were repeated some four or five times a week, with a gradually-increasing strength of current, and in the course of a month the hyperæsthesia had been so far relieved that the hand could be pressed upon the body with a considerable degree of firmness, and passed all over the body without causing pain. The pains that were continually

shooting down the limbs were not appreciably relieved until after we resorted to central galvanization, i. e., galvanization of the lumbar and sacral regions of the cord.

This method, persevered with, dissipated the remainder of the hyperæsthesia, which had hung fire under local faradization, and very greatly relieved the neuralgic pains in the limbs.

The patient was now able to sit up in bed, and the distressed expression of countenance had given place to an appearance of hope and even cheerfulness. At this stage, Dr. Fisher, on days when electricity was not administered, began to accustom her to the use of crutches, gradually lengthening them as she was able to increase the number of steps. At first, she was able to take but two or three steps, but in six weeks or two months she could not only move about her room and the halls for half an hour at a time, but on several occasions with assistance went to the top of the stairs and returned.

At one time she suffered a relapse, and was compelled to submit again to local treatment at the hands of Dr. Moses, but from this she rallied, and after having been in various ways treated for a year, she was sufficiently recovered to be able to undertake a long journey to her home. She there continued to improve with great rapidity, until she was able to attend with ease to her household duties, and in every sense was quite well. In this case it was the faradic current that first relieved the hyperæsthesia, but, after it had accomplished all that it was possible for it to do, galvanization of the spinal cord dissipated the remaining sensitiveness, relieved the neuralgic pains, and rendered possible the efficient assistance of Drs. Fisher and Moses, which aided so greatly in the recovery of this supposed hopeless case.

Cerebral Congestion associated with Vertigo and Numbness of the Left Side.—Symptoms aggravated by Faradization. Recovery under Central Galvanization.

CASE V.—Mrs. H. was directed to us by Dr. A. Brayton Ball, to be treated for symptoms of cerebral congestion. Her general condition was much below par, and her menstruation,

though regular, was painful and prolonged from eight to ten days. Severe headaches were frequent, and for two years she had suffered from decided numbness of the whole left side sufficient to prevent much labor or exercise. Faradization, both general and local, was essayed without good effect; indeed, the numbness and vertigo were decidedly aggravated. The second application, three days subsequently, was made with a current generated from four zinc carbon-cells. The positive pole was applied to the top of the head, and the negative immediately below the sternum. A slight increase of numbness was observed even from the weak current used, but in a few hours, this effect passed away leaving hardly a trace of the usual anæsthesia. This treatment was continued, at intervals of several days, for over a month, during which time she was annoyed but little if any by either vertigo or numbness.

Numbness of the Extremities, with Distressing Heat of Head, etc.—Mild Central Galvanization aggravates the Head-symptoms.—General Faradization is followed by decided Relief.

CASE VI.—On February 10, 1872, I was called to Mrs. P., who was under the professional care of Dr. Thomas Sabine. For several years the patient had been an invalid, suffering from ulceration and displacement of the womb. She was of a decidedly nervous organization, exquisitely sensitive to all external impressions, and yet her general appearance, so far as regards color, flesh, and expression, was indicative of a fair degree of health. There was great pain and tenderness over the left ovarian region, while at short intervals severe paroxysms of neuralgia, seated in the head and left shoulder, occasioned much distress. The attendant symptoms, however, which more especially interest us at this time, were the constant burning at the top of the head, and an annoying numbness of the extremities. The heat of head was so great that she felt obliged on nearly all occasions to wear cloths dipped in ice-water. I at first made use of the galvanic current passing through the brain and sympathetic, a current from but four ordinary-sized zinc carbon-cells. The effect was most unpleasant, since there immediately followed a decided in-

crease in the sense of numbness and heat, which did not abate under twenty-four hours. I now, by means of the moistened hand, applied, to all portions of the head and neck, a mild faradic current, extending the applications through sponges to the entire surface of the body.

A few such *séances* not only relieved the neuralgia of the head and coldness and numbness of the extremities, but in a great measure dissipated the distressing heat of head from which she so constantly suffered.

How can we account for the diametrically opposite effects of the currents in this and in the foregoing case? The explanation seems sufficiently easy. In the first instance cerebral congestion undoubtedly existed. The constant current was successfully operative, since it alone has power to penetrate to the brain, and to directly influence the circulation through the vaso-motor system of nerves.

In the second case it was evident that there was no marked disturbance of the circulation.

Most of her symptoms seemed dependent on a generally hyperæsthetic condition, which was aggravated when the sensitive central organs were submitted to the direct influence of galvanization, while the faradic current, by its well-known soothing and tonic effect on the peripheral nerves, and possibly by a gentle reflex influence on the brain and spinal cord, was speedily beneficial.

General Chorea, with Inability of the Patient to walk, feed himself, or distinctly speak.—Recovery under Central Galvanization, after the Failure of General Faradization and Medication.

CASE VII.—Master S., a little boy about ten years old, came to us through Dr. J. O. Farrington.

The patient had for some time suffered from general chorea of a decided character, but during the last few weeks it had so increased in severity that he was unable to walk or even feed himself. All his extremities as well as the face were in constant motion; his utterance was indistinct, and in weight he had decreased very much. There was no hereditary tendency of this character in the family, and the only cause to which

the symptoms could plausibly be attributed was a fall from a horse, which severely jarred him, some weeks before the disease manifested itself.

The treatment was varied. Fowler's solution and certain other remedies, which I do not now recall, had been faithfully tried, but without benefit. We began with mild general faradization, but, as the results did not accord with our expectations, we abandoned it and essayed very gentle central galvanization.

During the first week of this treatment no appreciable benefit seemed to be derived, without it was an improvement in sleep.

Soon after this, however, the effect observed was decided. His appetite became better, resulting naturally in increased weight; coördination of movement rapidly became possible, the utterance distinct, and in a few weeks recovery was complete.

Treatment was discontinued in February, 1871, and to this date there has been no evidence of a return of the disease.

Chorea, of Ten Months' Standing, of the Left Side and Right Arm, in a Girl of Eleven.—Recovery in Ten Weeks under Central Galvanization.

CASE VIII.—M. R., a little girl, aged eleven, was directed to me by Dr. H. H. Gregory, of Harlem. Some ten months before, the mother first observed slight convulsive twitchings of the left hand, which gradually increased in severity until in a few weeks the member was quite useless. In two or three months the left leg became choreic, and soon after the disorder extended to the right arm. It was one of those cases which obstinately resist ordinary internal medication, and was hence considered a fair opportunity to test the virtues of central galvanization. The treatment was given every other day, but for three weeks no apparent impression was made upon the disease.

During the fourth week the symptoms somewhat abated, and from this time forth the improvement was uninterrupted, until, in ten weeks from the beginning of the treatment, recovery was perfect.

The question very naturally and properly arises, What is the measure of benefit to be derived from the use of central galvanization in organic diseases of the brain and spinal cord? One-sided paralysis from cerebral effusion, paraplegia dependent on spinal apoplexy, softening of the brain, palsy agitans, progressive locomotor ataxy, (spinal sclerosis,) progressive muscular atrophy and kindred diseases have ever been regarded as the opprobria medicorum.

While no sane man would presume to triumphantly proclaim a method or a remedy as a panacea for these fearful diseases, yet it can be truthfully stated that in some one or more of the various forms of electrization we have under control a potent means by which they may be relieved, and sometimes even approximately cured. In the treatment of these various affections, both the galvanic and faradic currents are indicated, although the prominence to be given to the respective currents depends upon the characteristics of each individual case.

In hemiplegia for example it was formerly thought unsafe and useless to apply electricity until some months after the attack; it is now used almost immediately and with favorable results. By localized faradization, the tendency to muscular atrophy is undoubtedly resisted, and even after atrophy has taken place in the limb, it is no uncommon thing to see the parts develop with rapidity under the mechanical action of the current. By general faradization, the nutrition if impaired is improved, and by galvanization of the brain, the process of absorption is hastened.

Of all the cases of hemiplegia that have come under my observation, the treatment has resulted most favorably and the results have been most permanent where the patient was seen and submitted to treatment, within a comparatively short time subsequent to the attack.

Paraplegia of a reflex origin is of course amenable to electrization in a far greater degree, than when dependent on effusion within the cord, and yet in this last condition galvanization of the cord with faradization of the lower limbs, are generally indicated and are often of infinite service.

Of above a dozen cases of softening of the brain that have been under my care, and that have been treated more or less

persistently by electrization, not one has improved in any marked degree, and in but two or three were the symptoms even slightly alleviated.

Palsy agitans offers a more satisfactory field for electrical treatment. The faradic current in whatever manner used seems to possess but little influence over the disease. The most thorough form of central galvanization, however, very frequently exercises a controlling power over the constant agitation that is most grateful to the patient. I can hardly say that I have knowledge of an effectual cure wrought in this disease by any method of treatment, but in several cases, central galvanization has been followed by approximate and apparently permanent relief.

In locomotor ataxy, electrization is unquestionably the remedy par excellence and the only one in fact to which we can look with any confidence in the consideration of its therapeutics.

The experience and observation of the most able of German electro-therapeutists go to prove that this progressive disease may not only in many cases be arrested in its course, but most markedly relieved in every symptom. With these observations, my own fully accords.

The same encouragement is offered in the consideration of progressive muscular atrophy, a disease hardly less frequent and less certain in its progress than ataxy.

